



# Storm Data and Verification Program Overview

**NOAA's National Weather Service  
Office of Climate, Water, and Weather Services  
Verification Unit**

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# Presentation Outline



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  - History of Storm Data
  - Storm Data Entry and the StormDat Software
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# What is Storm Data?

- Storm data is the official collection of severe and unusual weather events.
- Event information contained in storm data is collected, quality controlled, and logged by forecasters at National Weather Service forecast offices (WFOs).



# History of Storm Data

- 1850 – Earliest known storm data reports
  - Data documented in memos by the military
- 1959 – First NCDC published *Storm Data* publication
  - Data documented using typewriter
- 1993 – First electronic version of storm data collection
  - Data documented using Corel WordPerfect 5.0 (DOS)
- 1996 – StormDat program created
  - Data documented using Corel Paradox database software



# Storm Data Entry and StormDat



- Each of the NWS's 123 WFOs is responsible for collecting events. They collect these reports from:
  - Official NWS storm surveys
  - Emergency managers
  - Official NWS observations
  - Amateur radio operators
  - Newspaper clippings / Media outlets
  - Other sources
- Events are logged using the StormDat program
- WFOs have up to 60 days from the end of a month to transmit storm data to NWS HQ



# StormDat Program Screen Capture



Paradox Runtime - [StormDat Windows 2000]

Menu Episode Edit Data Transfer Web Sites

an event type from the drop-down box... You can narrow down your selection by typing the first letter(s) of the event ty

StormDat Web Site

EVENT TYPE	EVENT SOURCE	STATE	COUNTY OR ZONE NAME	CITY/ZONE #
FLASH FLOOD	NEWSPAPER	OK	BECKHAM	009
TORNADO	BROADCAST MEDIA	OK	GRADY	051
TORNADO	BROADCAST MEDIA	OK	GRADY	051
TSTM WIND	LAW ENFORCEMENT	OK	COMANCHE	031
TSTM WIND	LAW ENFORCEMENT	OK	COMANCHE	031

DATE (MM/DD/YY)	TIME (HH:MM)	TIME ZONE	RANGE	AZI	BEGIN LOCATION	END DATE (MM/DD/YY)	END TIME (HH:MM)	END RANGE	END AZI	END LOCATION
05/04/01	17:00	CST			ELK CITY	05/04/01	17:00			ELK CITY
05/04/01	18:20	CST	2.0	NNE	AMBER	05/04/01	18:24	3.0	N	AMBER
05/04/01	18:05	CST	0.5	E	CHICKASHA	05/04/01	18:06	0.5	E	CHICKASHA
05/04/01	18:48	CST	7.0	ENE	GERONIMO	05/04/01	18:48	7.0	ENE	GERONIMO
05/04/01	18:36	CST	4.0	ENE	GERONIMO	05/04/01	18:36	4.0	ENE	GERONIMO

PATH LENGTH	PATH WIDTH	MAG	EM G/S	F	INJURIES	PROPERTY DAMAGE	PROPERTY DAMAGE EXP	CROP DAMAGE	CROP DAMAGE EXP	EVENT NARRATIVE
					1	30.0	K			Several cars stalled in high water,
0.7	50			0	0	0.0				This tornado was observed by two
0.2	25			0	0	0.0				This tornado was observed by two
						2.0	K			A barn was blown over, and minor
						5.0	K			A 250-gallon propane storage tank

Numerous thunderstorms formed across southwest Oklahoma the afternoon of the 4th and spread northeastward. Three tornadoes were confirmed, along with many reports of severe winds.

DELETE EVENT / CURRENT RECORD

ADD/REMOVE PICTURE TO CURRENT EVENT

CLEAR SCREEN TO ENTER NEW EPISODE

HELP ?

DELETE EPISODE X

LOOKUP ✓

EXIT

REPORTS

FATALITIES

SAVE ✓

1 of 20 [PRIVATE:PRIVATE.DS]

Edt



# Fields Collected by StormDat



- Event Type (ex. tornado, winter storm, flood)
- Beginning and Ending Time
- Beginning and Ending Location (state, county, location)
- Report Source
- Event Magnitude (ex. hail size, tornado f-scale, wind speed)
- Injuries and Deaths Associated w/Event
- Crop and Property Damage Estimates
- Narrative Description of Event



# Quality Control Features

- Finite list of severe and unusual weather events
- The StormDat program has an extensive quality control check when events are saved
- The StormDat program also runs a database integrity check on startup
- Event tracking numbers are used so events may be amended and/or deleted from the database





# Uses of Storm Data



- NCDC's *Storm Data* publication
- SPC's official severe weather database (tornado, hail, wind)
- NWS's short fused warning verification statistics
- NWS's internal service assessments
- Army Corps of Engineers
- Academic research studies
- Disaster reports
- Congressional and other government data requests
- Public data requests



# NCDC's Storm Data Publication



JANUARY 2001  
VOLUME 43  
NUMBER 01



## STORM DATA

AND UNUSUAL WEATHER PHENOMENA  
WITH LATE REPORTS AND CORRECTIONS



**noaa**

NATIONAL OCEANIC AND  
ATMOSPHERIC ADMINISTRATION

NATIONAL ENVIRONMENTAL SATELLITE,  
DATA AND INFORMATION SERVICE

NATIONAL CLIMATIC DATA CENTER  
ASHEVILLE, NC

### OUTSTANDING STORMS OF THE MONTH

#### 1. Freezing Temperatures Reach Florida

Following a cold frontal passage across the Florida peninsula on December 31, 2000, a large high pressure system moved from Canada southward toward the Southeast U.S. and northern Gulf of Mexico. The surface high pressure system brought widespread sub-freezing temperatures to Florida in early January 2001. Also affected were the West-Central and Southwest portions of the peninsula. Temperatures remained below freezing for six to nine hours. Many locations reported temperature minimums in the middle twenties. Early damage estimates were at nearly five million dollars over West-Central and Southwest Florida.



**Left:**

Photo depicts a closeup of oranges encased in icicles shortly after sunrise on January 1, 2001. The orange tree was next to a strawberry field being sprayed with water to protect the crop from sub-freezing temperatures. This photo was taken in Dover, Florida.

*(Photographs courtesy of Fraser Hale, St. Petersburg Times Newspaper photographer.)*



**Right:**

Photo shows a common scene across the interior portions of Florida in early January as farmers try to protect their crops.



# NCDC's Storm Data Publication



If you are interested in purchasing a subscription to the NCDC's Storm Data publication, please contact Stuart Hinson via e-mail at: [Stuart.Hinson@noaa.gov](mailto:Stuart.Hinson@noaa.gov)

Storm Data and Unusual Weather Phenomena										
Location	Date	Time Local Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons Killed	Number of Persons Injured	Estimated Damage Property	Estimated Damage Crops	Character of Storm	January 2001
<b>ALABAMA, Central</b>										
<b>Lowndes County</b>										
Hayneville	19	0800CST	0	0	0	0	3K	0	Thunderstorm Wind (G50)	
Trees and power lines were blown down near Gordonsville and in Hayneville.										
<b>Montgomery County</b>										
Maxwell Afb	19	0919CST	0	0	0	0	10K	0	Thunderstorm Wind (G53) *	
Wind was measured at 61 mph at Maxwell Air Force Base as a bow echo moved through the area.										
<b>Montgomery County</b>										
2.1 E Montgomery to 4.0 E Montgomery	19	0922CST	2.3	100	0	4	450K	0	Tornado (F0)	
A tornado from a bow echo configuration cut isolated down just west of Townsend County and near Little Branch in eastern Montgomery County. The tornado traveled southwesterly at approximately 70 mph and crossed through the Forest Hill area along the road and crossing near station 440000, located in some homes. The tornado caused the Alabama Highway and continued to destroy part of the Alabama center of Highway 100000. The bulk of the damage here occurred when several trees struck the structure. The tornado appeared to end in the south edge of Centre in Rural Park. Several houses injuries were reported.										
<b>Montgomery County</b>										
3.0 NE Montgomery to 4.0 NE Montgomery	19	0922CST	0	0	0	0	10K	0	Thunderstorm Wind (G50)	
A several path of damage occurred slightly east of a tornado path. Damage occurred from the north end of Centre Air Force Base through Montgomery, Chickamauga, Elberta and Wetumpka. In Montgomery/Chickamauga Division, Birmingham and into a residential area of Wetumpka Park. One casualty was also recorded and one house suffered significant damage in this area. Other damage was probably in the form of downed trees and power lines but no actual crop damage thought necessary. This damage path was 1/2 mile long and around 200 yard wide.										
This event was produced by a strong thunderstorm that exhibited a forward characteristic which is frequently accompanied by weak tornadoes and strong straight line winds. Wind speeds with the down-bow were measured at 61 mph at 9:17 AM and 61 mph at 9:21 AM at Maxwell Air Force Base at 1:37 AM.										
<b>Etowah County</b>										
Waco	19	0800CST	0	0	0	0	1K	0	Thunderstorm Wind (G50)	
Trees were blown down in Waco and some extent continued Etowah County.										
<b>Etowah County</b>										
Etowah	19	0800CST	0	0	0	0	1K	0	Thunderstorm Wind (G50)	
Trees and power lines were knocked down in Etowah.										
<b>Marion County</b>										
Tracyton	19	0800CST	0	0	0	0	2K	0	Thunderstorm Wind (G50)	
Power lines were blown down just north of Tracyton. The damage occurred in Wood Hill, Oak Hill, and Indian Hill.										
<b>Tallapoosa County</b>										
Embova	19	0800CST	0	0	0	0	2K	0	Thunderstorm Wind (G50)	
Trees were blown down in Embova.										
<b>Cherokee County</b>										
Lafayette	19	0800CST	0	0	0	0	2K	0	Thunderstorm Wind (G50)	
One large tree was blown down and killed on I-205. The tree caused damage to a house and a cabin.										
<b>Lee County</b>										
4.0 Gaffney	19	0800CST	0	0	0	0	2K	0	Thunderstorm Wind (G50)	
Trees were blown down in the Morgan area.										
<b>Tuscaloosa County</b>										
Tuscaloosa	19	0800CST	0	0	0	0	2K	0	Thunderstorm Wind (G50)	
Trees were blown down in the northern part of Tuscaloosa.										
<b>Jefferson County</b>										
28	0800CST	0	0	0	0	0	2K	0	Thunderstorm Wind (G50)	
Trees and power lines were knocked down on the American Blvd.										

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January 2001									
Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons		Estimated Damage		Character of Storm
					Killed	Injured	Property	Crops	
<b>ALABAMA, Central</b>									
<b>Lowndes County</b>									
Hayneville	19	0850CST 0905CST			0	0	3K	0	Thunderstorm Wind (G50)
Trees and power lines were blown down near Gordonsville and in Hayneville.									
<b>Montgomery County</b>									
Maxwell Afb	19	0919CST			0	0	10K	0	Thunderstorm Wind (G53) <sup>M</sup>
Wind was measured at 61 mph at Maxwell Air Force Base as a bow echo moved through the area.									
<b>Montgomery County</b>									
2.1 E Montgomery to	19	0922CST	2.3	100	0	4	450K	0	Tornado (F0)



# Future of Storm Data



- Over the new couple years the NWS plans on upgrading the StormDat program
- Planned enhancements:
  - turn the software into a web based program
  - map based entry screen (GIS)
  - upgrade database to mySQL
  - enhanced report generation
- Planned release: Late 2006



# Verification Program Overview



- The NWS uses select events in storm data for the purpose of it's short fused warning verification program
- Short fused warning products verified:
  - Severe Thunderstorm Warnings (SVR)
  - Tornado Warnings (TOR)
  - Flash Flood Warnings (FFW)
  - Special Marine Warning (SMW)
- Events are matched with warnings and scores such as probability of detection, false alarm ratio, and event lead time are generated



# Events Used for Verification

- Severe Thunderstorm Verification
  - 50kt winds and greater
  - $\frac{3}{4}$  inch hail
- Tornado Verification
  - all tornado events
- Flash Flood Verification
  - all flash flood events (not flood)
- Special Marine Verification
  - 34kt winds and greater over marine waters
  - $\frac{3}{4}$  inch hail over marine waters
  - waterspout events



# Matching of Events and Warnings



Paradox 10

File Edit View Insert Format Tools Window Help

Form Design : verif31.fsl

match warnings with events  
(StormDat Windows)

Fill in latitude and longitudes  
(StormDat Windows)

Apply 10 mile - 15 minute rule

APPLY RULE #2 to WARNINGS

Fill in latitude and longitude  
for 2001 only

Apply 10 mile - 15 minute rule  
SVR ONLY - NO TORN WARNS

Apply 10 mile - 15 minute rule  
MARINE EVENTS ONLY

verif31.fsl [Formdata]

Form Design : verif31.fsl

SCRL NUM CAPS

- Matching of events and warnings is done on the first business day of every month.
- The matching process takes approximately 5-7 hours





# Sample Verification Report

## NATIONAL WEATHER SERVICE VERIFICATION / STORM DATA

### VERIFICATION - SEVERE WEATHER - STATS ON DEMAND

#### NATIONAL WEATHER SERVICE SEVERE WEATHER STATISTICS

Period: 1/1/03 - 12/31/03

#### Summaries:

##### TORNADO WARNINGS ONLY

###### TORNADOS ONLY

Tornado warnings issued	:	4023
Tornado warnings verified	:	1014
Tornado warnings not verified	:	3009
False Alarm Rate (FAR)	:	.748

##### TORNADO EVENTS ONLY

###### TORNADOS ONLY

Tornado events	:	1531
Tornado events warned	:	1212
Tornado events unwarned	:	319
Average leadtime	:	13.5
Percent of events w/lead time > 0	:	71.7
Probability of Detection (POD)	:	.792
Critical Success Index (CSI)	:	.236





# Sample Verification Report

## NATIONAL WEATHER SERVICE VERIFICATION / STORM DATA

### VERIFICATION - SEVERE WEATHER - STATS ON DEMAND

#### NATIONAL WEATHER SERVICE SEVERE WEATHER STATISTICS

Period: 1/1/02 - 9/13/04

Counties: PRINCE GEORGE'S(MD) - MONTGOMERY(MD)

Severe Local Storms Verification Report for : **LWX - BALTIMORE/WASHINGTON, VA**

#### TORNADO WARNINGS ONLY

<u>YR</u>	<u>MTH</u>	<u>DAY</u>	<u>ISSUE TIME</u>	<u>EXPIRE TIME</u>	<u>COUNTY</u>	<u>STATE</u>	<u>TYPE BASIS</u>	<u>VERIFICATION</u>
2002	4	28	1702	1745	PRINCE GEORGE'S	MD	TORN-RAD	NOT VERIFIED
2002	5	13	1311	1345	MONTGOMERY	MD	TORN-PUB	NOT VERIFIED
2003	11	5	1421	1500	MONTGOMERY	MD	TORN-RAD	TORNADO
2004	5	25	1828	1930	PRINCE GEORGE'S	MD	TORN-RAD	NOT VERIFIED

#### TORNADO EVENTS ONLY

<u>YR</u>	<u>MTH</u>	<u>DAY</u>	<u>TIME</u>	<u>COUNTY</u>	<u>STATE</u>	<u>EVENT</u>	<u>WARN TIME</u>	<u>WARN TYPE</u>	<u>LEADTIME</u>
2003	11	5	1408	MONTGOMERY	MD	TORNADO		NOT VERIFIED	0
2003	11	5	1410	MONTGOMERY	MD	TORNADO	1421	TORN-RAD	0



# Future of Verification



The NWS plans on creating verification statistics for the following products in the near future:

- Winter Storm Warnings and Watches
- High Wind Warnings and Watches
- Flood Warnings
- Coastal Flood Warnings

We will be using events logged in storm data for the purpose of verifying observations



# Storm Data Program Overview

## Contact Information

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